

Claims

[c1] What is claimed is:

1. A light-emitting diode comprising:
a surface mounted package comprising:
a substrate having a first surface and a second surface;
two composite metal layers insulated from each other
and respectively extending from the first surface to the
second surface, each of the composite metal layers hav-
ing a copper layer positioned on the substrate and a sil-
ver layer positioned on the copper layer;
a light-emitting diode chip electrically connected to the
composite metal layers on the first surface; and
a sealing member covering the light-emitting diode chip
and adhering to a portion of the substrate and to a por-
tion of each composite metal layer;
a printed circuit board; and
two solder paste layers respectively covering portions of
the composite metal layers for electrically connecting the
printed circuit board to the composite metal layers on
the second surface;
wherein the silver layers are utilized for preventing the
solder paste layers from penetrating into space between
the sealing member and the composite metal layers and

for reflecting light beams generated by the light-emitting diode chip.

- [c2] 2. The light-emitting diode of claim 1 further comprising a plurality of solder balls for electrically connecting the light-emitting diode chip to the composite metal layers.
- [c3] 3. The light-emitting diode of claim 1 further comprising a plurality of conductive wires for electrically connecting the light-emitting diode chip to the composite metal layers.
- [c4] 4. The light-emitting diode of claim 3 wherein at least one of the composite metal layers is extended to space between the light-emitting diode chip and the substrate for reflecting light beams generated by the light-emitting diode chip and for transmitting heat energy generated by the light-emitting diode chip to an ambient environment.
- [c5] 5. The light-emitting diode of claim 1 wherein the substrate is an insulation substrate.
- [c6] 6. The light-emitting diode of claim 5 wherein the insulation substrate comprises a plastic substrate or a ceramic substrate.
- [c7] 7. The light-emitting diode of claim 3 wherein each of

the conductive wires comprises gold (Ag).

- [c8] 8. A light-emitting device comprising:
 - a surface mounted package comprising:
 - a substrate having a first surface and a second surface;
 - two metal layers insulated from each other and positioned on the substrate, the metal layers respectively extending from the first surface to the second surface;
 - a chip electrically connected to the metal layers on the first surface; and
 - a sealing member covering the chip and adhering to a portion of the substrate and to portions of the metal layers;
 - a printed circuit board; and
 - two solder paste layers for electrically connecting the printed circuit board to the metal layers on the second surface;
 - wherein the metal layers are utilized for preventing the solder paste layers from penetrating into space between the sealing member and the metal layers.
- [c9] 9. The light-emitting device of claim 8 wherein the chip comprises a light-emitting diode chip.
- [c10] 10. The light-emitting device of claim 9 wherein each of the metal layers comprises a copper layer positioned on the substrate and a silver layer positioned on the copper

layer.

- [c11] 11. The light-emitting device of claim 9 wherein each of the metal layers comprises a silver layer positioned on the substrate.
- [c12] 12. The light-emitting device of claim 9 further comprising a plurality of solder balls for electrically connecting the light-emitting diode chip to the metal layers.
- [c13] 13. The light-emitting device of claim 9 further comprising a plurality of conductive wires for electrically connecting the light-emitting diode chip to the metal layers.
- [c14] 14. The light-emitting device of claim 13 wherein at least one of the metal layers is extended to space between the light-emitting diode chip and the substrate for reflecting light beams generated by the light-emitting diode chip and transmitting heat energy generated by the light-emitting diode chip to an ambient environment.
- [c15] 15. The light-emitting device of claim 9 wherein the substrate is an insulation substrate.
- [c16] 16. The light-emitting device of claim 15 wherein the insulation substrate comprises a plastic substrate or a ceramic substrate.
- [c17] 17. The light-emitting device of claim 13 wherein each of

the conductive wires comprises gold.